

**56<sup>th</sup> Annual Gaseous Electronics Conference**  
**October 21-24, 2003**  
**NASA Ames Research Center**  
**San Francisco, California**

**GEC 2003**  
**Executive Committee**

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GE Research

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Lam Research Corporation

**FIRST ANNOUNCEMENT**

February 2003

The Fifty-Sixth Annual Gaseous Electronics Conference (GEC) will be held October 21-24, 2003 in the conference facilities of the Cathedral Hill Hotel in downtown San Francisco, California.

The GEC Executive Committee invites papers on basic phenomena and plasma processes in partially ionized gases, and on the theory and measurement of basic atomic and molecular collision processes. Papers reporting on experimental, theoretical, and computational studies which address either fundamental properties of low-temperature plasmas, or their applications, are encouraged. Applications of interest include, but are not limited to, plasma processing of materials, gas lasers, ion sources, gas discharge lamps, plasma chemistry, plasma-surface interactions, ionospheric phenomena, diagnostics, and similar topics. Although most papers will deal with low-energy processes, papers that concern electronic or radiative processes produced by high-energy electrons or heavy particles are also welcome.

**ARRANGED SESSIONS**

Each year the GEC Executive Committee selects topics for special emphasis. Arranged Sessions contain both invited and contributed oral presentations, and **participants are especially encouraged to submit contributed oral and poster papers on these topics**. The abstract sorting categories can be found on page 3. The topics and invited speakers selected for the 2003 GEC are:

**Material processing in low-pressure plasmas**

**Richard Gottscho**, *Lam Research Corporation*, Meeting the technology challenges for sub-100 nm etching

**Gilles Cunge**, *Laboratoire des Technologies de la Microélectronique, Grenoble*, Analysis of the plasma-surface interaction during silicon gate etching in HBr/Cl<sub>2</sub>/O<sub>2</sub>/CF<sub>4</sub> chemistry using mass spectrometry, broad band absorption, and XPS

**Hong-Young Chang**, *Korea Advanced Institute of Science and Technology*, Plasma diagnostics on plasma chemistry in an electron temperature controlled plasma reactor

**James Bradley**, *University of Manchester Institute of Science and Technology*, Understanding pulsed magnetron plasma processes through time-resolved measurement

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### **Plasma applications for nanotechnology**

**M. Meyyappan**, *NASA Ames Research Center*, Low temperature plasmas in carbon nano-tube growth and functionalization

**Masaharu Shiratani**, *Kyushu University*, Silicon nano-structure formation using plasmas

**Otto Zhou**, *University of North Carolina*, Carbon nanotubes as robust electron field emitters in gaseous and vacuum environments

### **High pressure glow discharges**

**Antoine Rousseau**, *Université Paris Sud*, Abatement of atmospheric pollutants by plasma-catalysis association

**Kunihide Tachibana**, *Kyoto University*, Spatiotemporal diagnostics of excited and reactive species in high pressure discharges

**Richard Miles**, *Princeton University*, Neutral gas temperature measurement by incoherent and coherent Rayleigh scattering

### **Biological and emerging applications of plasmas**

**Birgit Lohmann**, *Griffith University*, Electron impact ionization of water molecules

**Ken Stalder**, *Stalder Technologies and Research*, Plasma characteristics of electrosurgical discharges

**Simon M. Pimblott**, *Notre Dame University*, Ultrafast reactions of energetic species produced by ionizing radiation

**Zoran Petrovic**, *Institute of Physics, Belgrade*, Application of non-equilibrium plasmas in treatment of wool fibers and seeds

**Eva Stoffels**, *Technical University Eindhoven*, Plasma needle: treatment of living cells and tissues

### **Ionization and charge transfer collisions**

**Michael Schulz**, *University of Missouri-Rolla*, Three-dimensional imaging of atomic break-up processes

**Stephen J. Buckman**, *Australian National University*, Collision studies with metastable ( $2^3S$ ) helium atoms

**Thomas M. Miller**, *Air Force Research Laboratory, Hanscom AFB*, New techniques in the study of ion processes in weak plasmas

### **Rydberg plasmas and highly excited atoms**

**Phillip L. Gould**, *University of Connecticut*, Ultracold Rydberg atoms and plasmas

**Daniel Vrinceanu**, *Harvard-Smithsonian Center for Astrophysics*, Electron impact ionization of Rydberg atoms

### **Lighting**

**Dirk Urhlandt**, *Institut für Niedertemperatur-Plasmaphysik, Greifswald*, Low-pressure xenon positive column plasmas for lighting purpose: a model investigation

**Gerrit Kroesen**, *Eindhoven University of Technology*, Electrophoretic effects and helical instabilities in HID lamps studied under microgravity conditions

**Klaus Barschat**, *Drake University*, Calculations of electron-atom collision cross sections for lighting applications

## ORAL AND POSTER SESSION TOPICS

In addition to the special topics listed above, the Executive Committee solicits contributed oral and poster presentations on the wide range of topics normally addressed at the GEC. The abstract sorting categories for special and regular session are:

- |   |  |
|---|--|
| 1.1 Electron and photon collisions with atoms and molecules                           | 1.17 Thermal plasmas: arcs, jets, switches, other                        |
| 1.2 Heavy particle interactions: ion-atom, ion-molecule, neutral-neutral, other       | 1.18 Laser media, kinetics, processes                                    |
| 1.3 Dissociation, recombination, and attachment                                       | 1.19 Lighting plasmas: glows, arcs, flat panels, novel sources, others   |
| 1.4 Molecular clusters and many-body problems   | 1.20 Plasma chemistry: atmospheric, gas phase, surface                   |
| 1.5 Computational methods for atomic and molecular processes                          | 1.21 Plasma boundaries: sheaths, boundary layers, other                  |
| 1.6 Distribution functions and transport coefficients: electrons, ions                | 1.22 Plasma-Surface interactions   |
| 1.7 Near-threshold collision processes  | 1.23 Device and materials processing: etching, deposition, new materials |
| 1.8 Collisions with complex targets   | 1.24 Environmental applications  |
| 1.9 Ionization of atoms and molecules   | 1.25 Treatment of textiles   |
| 1.10 Other: atomic and molecular collisions   | 1.26 Biological applications of plasmas                                  |
|   | 1.27 Plasma propulsion   |
|   | 1.28 Plasmas and nanostructured materials                                |
| 1.11 Glows: dc, pulsed, rf, microwave, other  | 1.29 Innovative plasma applications                                      |
| 1.12 Coronas, breakdown, and sparks   | 1.30 Dusty plasmas   |
| 1.13 Capacitively coupled plasmas   | 1.31 Negative ion plasmas  |
| 1.14 Inductively coupled plasmas  | 1.32 Instabilities in reactive discharges                                |
| 1.15 Magnetically-enhanced plasmas: ECR, helicon, magnetron, other                    | 1.33 Computational methods for plasmas                                   |
| 1.16 Atmospheric pressure nonthermal plasmas, dielectric barrier discharges, displays | 1.34 Plasma diagnostics: optical, electrical, other                      |
|   | 1.35 Other: plasmas  |

## THE GEC FOUNDATION TALK

The Executive Committee is pleased to announce the Foundation Talk at the 2003 GEC:

**John Coburn**, *University of California, Berkeley*, "The evolution of plasma etching in microelectronic manufacturing"

The GEC Foundation Talk is a plenary talk at each GEC. Its aim is to present a cogent overview of a topical area and to put it into context for the very cross-disciplinary audience that attends the GEC. The talk covers both introductory material to guide students and newcomers, as well as cutting edge work from the speaker's own experience to engage the expert.

## ABSTRACT SUBMISSION

Contributed papers may be given orally in a 15-minute timeslot (12 minutes for presentation and 3 minutes for questions) or as a poster. For either mode, authors must submit an abstract, which briefly but accurately describes the scientific work. The GEC does not consider an author's membership in any scholarly society when assessing a contribution. Since the conference utilizes the American Physical Society's electronic abstract submission process,

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non-APS members should contact the Conference Secretary ([gec@dm1.arc.nasa.gov](mailto:gec@dm1.arc.nasa.gov)) or the APS meetings department (Mr. Vinaya Sathyasheelappa, [sathyash@aps.org](mailto:sathyash@aps.org)) for additional instructions.

Complete abstract submission instructions can be obtained at the following website: <http://www.aps.org/meet/abstracts/meet-abstract.html>.

**The deadline for receipt of abstracts is 5:00 p.m. Eastern Standard Time on Friday, June 6, 2003.** We strongly urge you to proofread your *formatted* abstract before submission. **Please note that abstracts are no longer accepted via email.** To submit a **contributed abstract** using the online web submission process, an author needs to know two things: (1) the number and ordering of authors and collaborators, and (2) abstract content. The web page will guide you through the rest. Try a test submission before submitting your abstract. Log onto <http://abstracts.aps.org> and select the meeting TEST. Follow the directions online to create your own practice abstract. When ready to submit your abstract online, select the meeting GEC03 by clicking on the appropriate button. A form will be created for you. Simply input the information. **Invited speakers** should refer to their letters of invitation for instructions on locating the invited template.

Those contributors who are absolutely unable to submit an abstract via the web should contact Mr. Vinaya Sathyasheelappa at [sathyash@aps.org](mailto:sathyash@aps.org).

If you have questions regarding abstract submission, please send them to [abs-help@aps.org](mailto:abs-help@aps.org).

## CONFERENCE SECRETARY

Further information on the conference may be obtained from the Conference Secretary at the following address:

Dr. Helen Hwang  
NASA Ames Research Center  
Mail Stop 230-3  
Moffett Field, CA 94035-1000

Voice: (650) 604-1368, Email: [gec@dm1.arc.nasa.gov](mailto:gec@dm1.arc.nasa.gov)

## GEC INFORMATION ONLINE

The official website for the GEC 2003 conference is <http://gec2003.arc.nasa.gov>. This website will contain the most detailed and up-to-date information on the conference. Sign-up to an automated mailing list is available through the website. Through this mailing list, further announcements and deadline reminders will be sent by e-mail. You may also sign-up by sending email to the following address with the word "subscribe" in the subject line: [gec2003-request@lists.arc.nasa.gov](mailto:gec2003-request@lists.arc.nasa.gov).

Additional information may also be obtained from the American Physical Society website at <http://www.aps.org>. The GEC maintains a permanent website at <http://www.gec.org>.

## REGISTRATION

**The deadline for early registration is August 22, 2003.** Registration information, including instructions and forms, will be included in the second announcement. Registration forms will be accepted via mail and FAX. We also plan to have an option for online registration.

### REGISTRATION FEES\*

	Early (before August 22, 2003)	Late (after August 22, 2003)
Regular attendee	\$255	\$310
Student/Retiree (includes banquet)	\$140	\$190
Banquet dinner	\$40	\$40

\*Fee includes opening reception, refreshment breaks, and conference materials.  
Banquet dinner is included for students and retirees.

## ACCOMMODATIONS

The conference will be held at the Cathedral Hill Hotel in downtown San Francisco, California. A block of rooms has been reserved at the Cathedral Hill Hotel for conference participants, providing the most convenient accommodations for the conference. The hotel is within walking distance of numerous attractions and restaurants in San Francisco. A downtown map can be found on the conference website <http://gec2003.arc.nasa.gov>. Room rates and contact information for the hotel are shown below. Conference participants must make their own reservations directly with the hotel. **Be sure to mention the Gaseous Electronics Conference when you make your reservation to insure that you get the conference rate. The deadline for making reservations at the conference rate is September 18, 2003.** After September 18, the conference rates are no longer guaranteed. For those who wish to extend their stay, the conference rates listed below are available from October 18 through October 25, 2003.

**IMPORTANT NOTE: Please note that October is a busy month for the Cathedral Hill Hotel and the GEC room block is limited. Please make your reservation early since the availability of rooms cannot be guaranteed EVEN BEFORE SEPTEMBER 18 if the room block is filled.**

#### Cathedral Hill Hotel—GEC 2003 Conference Site

<http://www.cathedralhillhotel.com>

1101 Van Ness Ave.

San Francisco, CA 94109

Phone: (415) 776-8200 or 1-800-622-0855, Fax: (415) 441-2841,

e-mail [reservations@cathedralhillhotel.com](mailto:reservations@cathedralhillhotel.com)

\$150 single or double, +\$10 for each additional person. Rates do not include a 14% occupancy tax.

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## TRAVEL

Conference participants arriving by air can fly into the San Francisco International Airport (code SFO), which is served by all major airlines. The airport is about 15 miles from the conference hotel in downtown San Francisco. Other airports that may offer cheaper airfares are Oakland International (OAK) and San Jose (SJC). Taxi fare from SFO is approximately \$37 one-way. Shuttle service, such as through Super Shuttle (<http://supershuttle.com>), costs \$12.50 one-way from SFO to the Cathedral Hill Hotel (as of Feb. 2003). The Bay Area Rapid Transit system (BART) will also connect from SFO to downtown SF by October. Details will be given in the next announcement. **Rental cars are not recommended, as traffic and parking in San Francisco are difficult and expensive.** For guests of the Cathedral Hill Hotel parking is available at a daily rate of \$17, including in and out privileges. Parking for conference attendees is available in the hotel garage, with limited parking, at a daily rate of \$8. We strongly encourage local attendees to carpool or take public transportation.

## BANQUET AND RECEPTION

An opening reception will be held on the evening of Monday, October 20, 2003, in the Cathedral Hill Hotel, starting at 7:00 p.m. A banquet will also be held at the Cathedral Hill Hotel on Thursday evening, October 23. Conference participants are encouraged to attend the reception and the banquet.

## EXHIBITORS

Once again this year we will be making arrangements to host exhibitors of products of interest to the GEC community. A list of conference exhibitors will be provided in a later announcement. Firms interested in exhibiting at the conference should contact the Conference Secretary.

## STUDENT SUPPORT

### A. GEC STUDENT AWARD FOR EXCELLENCE

In order to recognize and encourage the outstanding contributions students make to the Gaseous Electronics Conference, the GEC Executive Committee will once again recognize the best paper presented by a student with the:

### ***GEC Student Award for Excellence***

Only oral presentations are eligible for the prize. Nominations for the award consist of a copy of the student's abstract (plain text if submitting via email, please do **NOT** send the raw LaTeX file), and a supporting letter from the student's advisor. (**Note:** this letter is separate from the letter of application for student travel award.) Advisors may nominate only one student. The letter of recommendation from the advisor should outline why the student candidate should be considered for the award, how much of the work presented was done by the student, and other supporting information. Email nominations are strongly encouraged. Nominations should be sent by the abstract deadline (June 6, 2003) to the conference chair (address continued on following page):

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GEC Student Award Nominations  
c/o Prof. Lepsha Vušković  
Old Dominion University  
Department of Physics  
4600 Elkhorn Avenue, Room 306  
Norfolk, VA 23529 USA  
FAX: 757-683-3038, Email: [yuskovic@physics.odu.edu](mailto:yuskovic@physics.odu.edu)

Based upon the abstracts submitted, the GEC Executive Committee will review the nominations and select **Student Award Finalists**. Members from the GEC Executive Committee will serve as judges. Judges will attend the finalists' talks and select the award winner. The recipient of the Student Award for Excellence will be announced at the Banquet and will be presented with an award certificate along with a \$500 prize.

## **B. STUDENT TRAVEL ASSISTANCE**

The GEC is committed to support the participation of students. In 2001, the GEC provided travel support for 24 students. In 2002, the GEC received only 16 applications for student travel support. Because of the additional costs associated with staying in San Francisco, the GEC would like to encourage student attendance by increasing the level of student support in 2003. Advisors may request partial reimbursement of travel expenses for students attending and presenting papers at the GEC. To request support, student advisors should send a letter of application and a copy of the student's abstract (plain text file if submitting via email, please do **NOT** send the raw LaTeX file) to the conference secretary at the address below. Applications must be received no later than the abstract deadline, June 6, 2003. Email applications are strongly encouraged. (**Note:** The student travel assistance request letter is separate from the letter of nomination for the GEC Student Award for Excellence.) Send applications for student travel assistance to:

GEC Student Travel Assistance  
c/o Dr. Helen Hwang  
NASA Ames Research Center  
Mail Stop 230-3  
Moffett Field, CA 94035-1000 USA  
FAX: (650) 604-0350, Email: [gec@dm1.arc.nasa.gov](mailto:gec@dm1.arc.nasa.gov)

### **SUMMARY OF DEADLINES**

Abstract submission:	<b>June 6, 2003, 5:00 p.m. EST</b>
Nomination for Student Award of Excellence:	June 6, 2003
Requests for student travel assistance:	June 6, 2003
Early registration:	August 22, 2003
Conference Hotel registration:	September 18, 2003